A best evidence synthesis on the link between budgetary participation and managerial performance

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A BEST EVIDENCE SYNTHESIS ON THE LINK BETWEEN BUDGETARY PARTICIPATION AND MANAGERIAL PERFORMANCE

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Abstract

Using the best evidence synthesis method (Slavin, 1995), we find out an accurate summary on the link between budgetary participation (BP) and managerial performance (MP). The use of selection criteria allowed to decrease the heterogeneity. Our results report the presence of the heterogeneity by cultural and industrial contingencies. American surveys reveal a significant positive link but suffer from heterogeneity of the sample. Under the sample homogeneity principle, Australian surveys reveal a non-significant negative link and only Taiwanese surveys reveal a positive and significant link. This last result has to encourage researchers to continue the study of publicly traded firms in the Taiwan Stock Exchange to study the causal link between the two variables with a Granger test and to study the evolution of this link over time in other countries.

Keywords: best evidence synthesis, budgetary participation, managerial performance, meta-analysis, subgroup analysis

JEL Classification: M49, C89

1. Introduction

"A few writers refer to comparing or combining apples and oranges, but the meta-analytic mixtures are usually too heterogeneous to be described with only two fruits. Other writers, with lower levels of enthusiasm or reverence, talk about rotten fruits or even less savoury substances" (Feinstein 1995, 72). Feinstein's citation is helpful to understand that selectivity is much more attractive than combining heterogeneous papers into a standard meta-analysis that lacks the scientific precautions offered by individual results from randomised trials.

Meta-analysis is a quantitative method of combining the results of independent studies and of synthesizing all the summaries and the conclusions usable to evaluate notably effectiveness of a managerial practice. This type of syntheses differs from traditional reviews of literature using a narrative format to summarise the results of studies on a topic to draw conclusions or inform theory.

In accounting literature, meta-analysis was used to aggregate results in numerous fields (Ahmed, and Courtis 1999, Hay *et al.* 2006, Trotman, and Wood 1991, among others). To the best of our knowledge, two meta-analyses (Derfuss 2009, Greenberg *et al.* 1994) and many reviews of literature were written about the link between budgetary participation and managerial performance (*see* for example: Chalos, and Poon 2001, Shields, and Shields 1998).

Budgetary participation (BP hereafter) is usually defined as "a process in which a manager is involved with, and has influence on, the determination of his or her budget" (Shields, and Shields 1998, 49). A *budget* is an expression of company expectations presented in economic terms for a future time period (Samuelson 1973, 31). An usual budgetary participation assessment is Milani's scale which measures the perceived influence of a "budgetee" on a budget (Milani 1975).

Employee's *performance* has been defined as "the degree to which successful role achievement is accomplished" (Ferris 1977, 610). The usual *managerial performance* (MP hereafter) questionnaire is based on the results of a survey conducted by Mahoney *et al.* (1963, 1965) that measures eight performance dimensions (planning, investigating, coordinating, evaluating, supervising, staffing, negotiating, representing). This questionnaire provides an overall measure of performance. Mahoney's and Milani's scales were used by most of studies investigating the link between BP and MP.

Derfuss (2009) found that BP and MP are significantly and positively linked. Moreover, the link between BP and MP seems contingent on industry differences. Nevertheless, Derfuss' meta-analysis on this link includes heterogeneous results and only papers published in English language. Following

Feinstein (1995), it could be interesting to combine only the quantitative results based on randomised samples.

Our research question is the following one: **is Derfuss' meta-analysis result valid when the only trials based on randomised samples are combined?** By selecting studies with "randomised sample" criterion, we did a "best evidence synthesis" (Slavin 1995).

Best evidence synthesis is "a response to concerns about misleading conclusions from meta-analyses" (Slavin 1995, 11). Following Slavin, if a literature contains some studies high in internal and external validity, thus lower quality studies had to be excluded from the combination of the results. According to Feinstein (1995), studies using randomised samples are more homogeneous and could be aggregated in a meta-analysis.

The rest of the paper is organized as follows. Section 2 describes the data and the used method. Section 3 presents the empirical results. Section 4 discusses them and section 5 concludes.

2. Data and method

2.1. Process of studies collection

Firstly, we collected papers from existing reviews of literature and meta-analyses (Banović 2005, Shields, and Shields 1998, Chalos, and Poon 2001, Derfuss 2009). Then, the first draft was published in the *Muenchen RePec* base of working papers. Thus, our paper appeared in *scholar.google.com* and related papers were collected. These new papers were included in the first draft. This procedure has been iterated until stability of our base of papers on the link between BP and MP.

Finally, we based our synthesis on the list of papers which appears in Appendix. Seventy-six papers were gathered. Some papers have not statistical results and others have unusable results in a meta-analysis because of lack of precisions. Our meta-analysis considers more papers than the one by Derfuss (2009) and our method differs.

2.2. Methods and criteria

To ensure reproducibility of our results, our best evidence synthesis used fixed-effect model of meta-analysis (Hedges, and Olkin 1985). Their statistical procedure is recognised in many scientific fields. The result of our first draft was computed in a spreadsheet. Then, a triangulation of the results was done by using "rmeta": an R package for meta-analysis.

We excluded the following papers from our best evidence synthesis:

- Studies which do not use Milani's measure of budgetary participation (Milani 1975) and Mahoney's one of managerial performance (Mahoney *et al.* 1963, 1965). This exclusion avoids the combination of papers which use different measure scales;
- Laboratory experiments that have low external validity.

After filtering with these two criteria, our base of papers gathered forty-four trials. For the best evidence synthesis, following Feinstein (1995), we used a criterion to exclude the studies which are not based on a randomised sample. Thus, the best evidence synthesis is only based on fifteen randomised trial results coming from the papers summed up in Table1. Randomised-sample results that do not use Milani's and Mahoney's scales (Breaux 2004, Chong *et al.* 2006, Dunk 1995, Kobori 2006) or which presentation of the results is not enough clear to be used (Abdullah 1998, Chong, and Chong 2002) are excluded from the analysis.

Sometimes, the use of selection criteria cannot eliminate heterogeneity between individual studies. If the heterogeneity test rejects the homogeneity null hypothesis, one will use subgroup analysis or one will assess the quality of trials. Nevertheless, evaluation of the methodological quality of a study is a difficult burden (Cho, and Bero 1994). Moreover, the use of quality score is highly criticized in literature (Moher *et al.* 1995m among many others). Thus, subgroup analysis seems to be a better research strategy.

Table 1. Papers used for the best evidence synthesis

Randomised-sample papers	Firm description/ Sector	Country	Use of Milani (1975) and Mahoney *et al.* (1963, 1965) scales
Brownell, and Dunk (1991)	Manufacturing companies	Australia - Sydney	x
Chalos, and Poon (2001)	Listed companies	USA (supposed)	x
Chong, and Bateman (2000)	Manufacturing companies	Australia	x
Dunk (1990)	Manufacturing companies	UK	x
Dunk (1993)	Manufacturing companies	Australia - Sydney	x
Hoque, and Brosnan (2007)	Coal mining companies	Australia	x
Kren (1992)	Manufacturing companies	USA	x
Lau, and Buckland (2000)	Mining companies	Norway	x
Lau, Low, and Eggleton (1995)	Manufacturing companies	Singapore	x
Lau, and Tan (1998)	Financial institutions	Australia/ Singapore	x
Ni, and Su (2001)	Large and Small companies	Taiwan	x
Ni, Su, Chung, and Cheng (2005)	Manufacturing companies	Taiwan	x
Quirin, O'Bryan, and Donnelly (2004)	Large companies	USA	x
Su, and Lin (2007)	Manufacturing companies	Taiwan	x
Subramaniam, and Ashkanasy (2001)	Food manufacturing companies	Australia	x

The presence of cultural contingencies was studied in the literature (Frucot and Shearon 1991, Lau *et al.* 1995, Tsui 2001). The link between BP and MP depends on cultural variables. Thus, if the homogeneity null hypothesis is rejected, it will be useful to make an analysis of differences between cultural subgroups in order to study the causes of the heterogeneity.

The heterogeneity reduction could help to see the impact of other variables on the relationship between BP and MP and to make some recommendations for further research.

3. Results

Our final sample is then of 15 results. The summary effect is about -0.0165 (95% confidence interval = [-0.0345, 0.0015]). One cannot rely on this result because of the presence of heterogeneity among results (estimated heterogeneity variance: 0.013, p-value = 0; test for heterogeneity: $\chi^2(13) = 58.76$, p-value = 0). The results of these heterogeneity tests has to be compared to the ones without the measurement scale criterion (estimated heterogeneity variance = 0.011, p-value = 0; Test for heterogeneity: $\chi^2(18) = 67.51$, p-value = 0). This criterion decreases the heterogeneity, but the homogeneity of the individual results is not significant.

Following Frucot and Shearon (1991), Lau *et al.* (1995) and Tsui (2001), a cultural subgroup analysis was computed. The subgroups are the following: Australian managers (5 randomised-sample results using Milani's and Mahoney *et al'*s scales), American ones (3) and Taiwanese ones (3). The studies based on survey of managers from other countries were excluded from the subgroup analysis, because of the lack of studies from some political territories.

From the Australian subgroup synthesis, it appears a non-significant negative link between BP and MP (summary effect = -0.0184 with 95% CI = [-0.0865, 0.0496]). One can rely on this subgroup synthesis because of non rejection of the homogeneity null hypothesis (estimated heterogeneity variance = 0.0022, p-value = 0.263; test for heterogeneity: $\chi^2(4) = 5.24$, p-value = 0.2633). The result seems to be more homogeneous. Hoque and Brosnan's paper increases the heterogeneity (Figure 1): sectoral and industrial contingencies could explain this.

From the American subgroup synthesis, it appears a significant positive link between BP and MP (summary effect = 0.242 , 95% CI = [0.12, 0.364]). One cannot rely on this subgroup best evidence synthesis because of rejection of the homogeneity null hypothesis at the 5% level of significance (estimated heterogeneity variance = 0.025, p-value = 0.044; test for heterogeneity: $\chi^2(4) = 6.26$, p-value = 0.0437). The synthesis plot shows a tendency (Figure 2).

But because of the lack of homogeneity between these individual results, one cannot infer something about this temporal tendency.

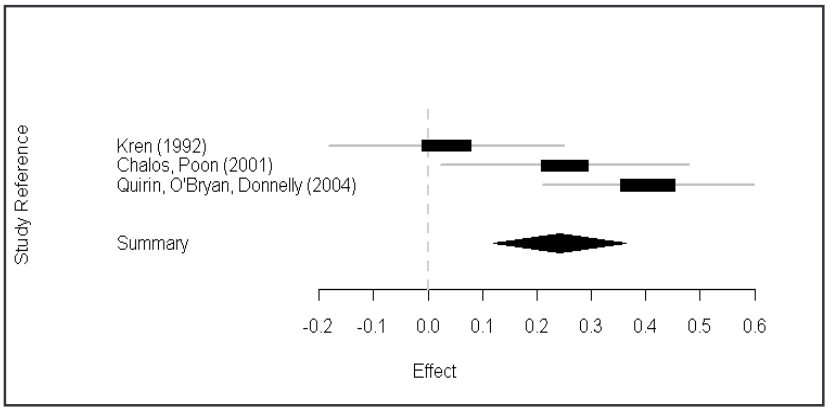

Figure 1. Best evidence synthesis of the Australian results

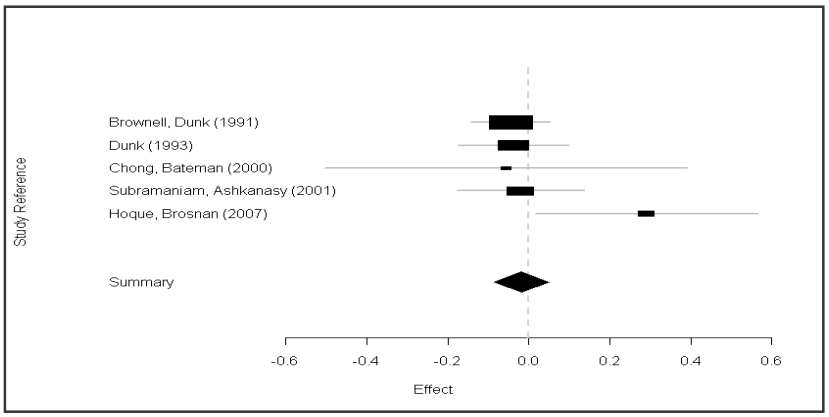

Figure 2. Best evidence synthesis of the American results

From the Taiwanese subgroup synthesis, it appears a significant positive link between the studied variables (summary effect = 0.109, 95% CI = [0.0301, 0.188]). One can rely on this subgroup result because of non rejection of the homogeneity null hypothesis at the 5% level of significance (estimated heterogeneity variance: 0.0093, p-value = 0.057; test for heterogeneity: $\chi^2(2) = 5.72$, p-value = 0.0571). The synthesis plot shows the same tendency (Figure 3) as the American subgroup one (Figure 2). The relation between BP and MP evolves positively over time.

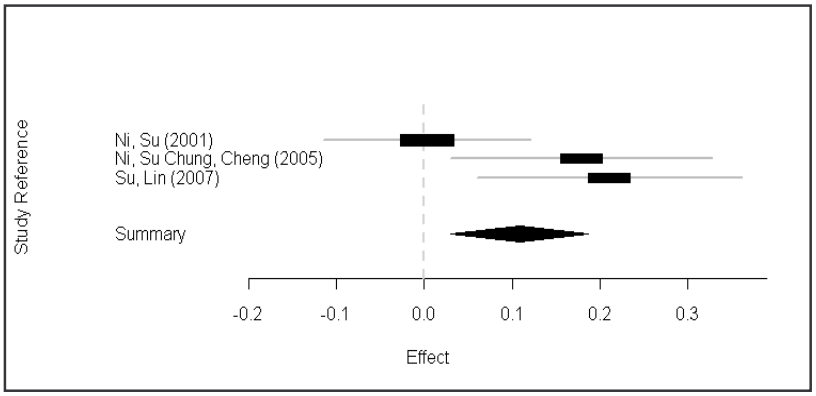

Figure 3. Best evidence synthesis of the Taiwanese results

4. Comments and further research

From these results, it is possible to highlight and to comment three of them. Firstly, the Australian synthesis shows a non-significant negative link between BP and MP that sheds lights on a cultural particularity in Australia: participating in budget determination has no effect on managerial performance. Secondly, the synthesis of the Taiwanese subgroup is really interesting because the sample is the same through studies: publicly traded firms in the Taiwan Stock Exchange. Thus, the time dependency of the link between BP and MP is shown when the effects of cultural and industrial contingencies are under control. Thirdly, Derfuss' results cannot be rejected following our analyses. In fact, in the best evidence synthesis of American subgroup, the lack of control on industrials contingencies could be linked to higher heterogeneity than in the Australian and Taiwanese subgroup.

Based on these comments, it is possible to give a recommendation for further research. The time dependency of the link between BP and MP was inferred from a limited field: the publicly traded firms in Taiwan Stock Exchange from 2001 to 2007. One should examine the robustness of this result:

- in the long-run, by surveying annually traded firms in the Taiwan Stock Exchange during twenty years or more. Then, one will be able to show the evolution over time of the causal link between BP and MP with a Granger test of causality;
- between countries, studying the same firm populations over time (in different political territories).

5. Conclusion

Finally, after having shown that meta-analysis based on the selection of homogeneous individual results is better than "meta-analytic mixtures (...) usually too heterogeneous" (Feinstein 1995, 72), we justified the use of some selection criteria. Moreover, if the combined results are still significantly heterogeneous, it will be justified to combine papers by cultural subgroups.

The best evidence synthesis using "randomised-sample" and "same measurement scales" criteria is heterogeneous. Thus, we have analysed cultural subgroup syntheses. On the base of our subgroup syntheses, it seems that cultural and industrial contingencies are highly plausible. Whereas the Australian subgroup analysis exhibits a negative but non-significant link between BP and MP, the Taiwanese subgroup analysis exhibits a positive and significant one. Both results are based on homogeneous studies. Moreover, the synthesis based on survey of managers of publicly traded firms in Taiwan Stock Exchange from 2001 to 2007, is significantly positive and homogeneous. From this subgroup synthesis, it appears that the link between BP and MP is time dependent.

This time dependency has to be confirmed in further research. One could use the Taiwanese Stock Exchange as a basis to observe the long-run evolution and to test the causal link between BP and MP with Granger's causality test or, if expectations play a role, Sims' one (Granger 1969, Sims 1980). One could replicate the Taiwanese synthesis result by studying this link on the same populations of companies over time in different political territories.

Last but not least, Derfuss' results cannot be rejected following our subgroup analysis. In fact, in the best evidence synthesis of American subgroup, the lack of control on industrial contingencies could be linked to higher heterogeneity than in the Taiwanese and Australian subgroups.

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APPENDIX

The literature on the link between BP and MP
(Some of them are not usable for our analysis as explained)

Studies	Samples	Randomised-sample	Budgetary participation measurement scale	Managerial performance measurement scale
Abdullah, 1998	79 Australian managers	Yes	Milani (1975)	Mahoney *et al*. (1963, 1965)
Agbejule, and Saarikoski, 2006	83 Finnish managers	No	Milani (1975)	Mahoney *et al*. (1963, 1965)
Alam, and Mia, 2006	113 Bangladeshi NGO managers	No	Milani (1975)	Mahoney *et al*. (1963, 1965)
Aranya, 1990	97 Canadian managers	No	Personal scale	Personal scale
Arifin, 2007	44 Indonesian managers	No	Personal scale	Personal scale
Bass, and Leavitt, 1963	3 experiments with 36 managers (USA supposed)	Yes (supposed)	Personal scale	Personal scale
Bento, and White, 2006	64 American managers	No	Chow (1999) adapted from Milani (1975)	Mahoney *et al*. (1963, 1965)
Breaux, 2004	197 AICPA members (USA)	Yes	Clinton and Hunton (2001)	Mahoney *et al*. (1963, 1965)
Brownell, 1981	Experiment with 46 students and 48 managers (USA)	No	Personal scale	Personal scale
Brownell, 1982a	38 American managers	No	Hofstede (1967) and Milani (1975)	Mahoney *et al*. (1963, 1965)
Brownell, 1982b	40 American managers	No	Hofstede (1967) and Milani (1975)	Mahoney *et al*. (1963, 1965)
Brownell, 1983	46 (supposed Australian) managers	No	Hofstede (1967) and Milani (1975)	Mahoney *et al*. (1963, 1965)
Brownell, 1985	61 (supposed Australian) managers	No	Milani (1975)	Mahoney *et al*. (1963, 1965)
Brownell, and Dunk, 1991	79 Australian managers	Yes	Milani (1975)	Mahoney *et al*. (1963, 1965)
Brownell, and Hirst, 1986	76 Australian managers	No	Milani (1975)	Mahoney *et al*. (1963, 1965)
Brownell, and McInnes, 1986	108 (supposed American) managers	No	Hofstede (1967) and Milani (1975)	Mahoney *et al*. (1963, 1965)
Brownell, and Merchant, 1990	146 (supposed American) production managers	No	Adapted from Swieriga and Moncur (1975)	Personal scale
Chalos, and Haka,1989	Experiment with 240 M.B.A. students (USA supposed)	Yes	Personal scale	Personal scale
Chalos, and Poon, 2001	72 (supposed American) marketing managers	Yes	Milani (1975)	Mahoney *et al*. (1963, 1965)

Studies	Samples	Randomised-sample	Budgetary participation measurement scale	Managerial performance measurement scale
Chenhall, and Brownell, 1988	33 (supposed American) managers	No	Milani (1975)	Personal scale
Cherrington, and Cherrington, 1973	Experiment with 230 business students (USA supposed)	No	Personal scale	Personal scale
Chong, and Bateman 2000	79 Australian managers	Yes	Milani (1975)	Mahoney *et al*. (1963, 1965)
Chong, and Chong, 2002	79 Australian managers	Yes	Milani (1975)	Mahoney *et al*. (1963, 1965)
Chong, Eggleton, and Leong, 2006	74 Australian managers	Yes	Adapted from Milani (1975)	Personal scale, consistent with Merchant (1981)
Dunk, 1989	26 managers from North UK	Yes	Milani (1975)	Mahoney *et al*. (1963, 1965)
Dunk, 1990	26 managers from North UK	Yes	Milani (1975)	Mahoney *et al*. (1963, 1965)
Dunk, 1993	78 American managers	Yes	Milani (1975)	Mahoney *et al*. (1963, 1965)
Dunk,1995	78 Australian managers	Yes	Milani (1975)	Adapted from Merchant (1981, 1984) and from Brownell and Merchant (1990)
Eker, 2009	150 Turkish managers	No	Milani (1975)	Mahoney *et al*. (1963, 1965)
Frucot, and Shearon, 1991	83 Mexican managers	No	Milani (1975)	Mahoney *et al*. (1963, 1965)
Frucot, and White, 2006	178 American managers	No	Milani (1975)	Mahoney *et al*. (1963, 1965) and Heneman (1974)
Godener, and Fornerino, 2009	155 French managers	No	Adapted from Godener and Fornerino (2005)	Adapted from Govindarajan and Gupta (1985)
Govindarajan 1986	77 (supposed American) managers	No	Swieringa and Moncur (1974)	Mahoney *et al*. (1963, 1965)
Gul, Tsui, Kwok, and Fong, 1995	37 managers from Hong Kong	No	Milani (1975)	Mahoney *et al*. (1963, 1965)
Hassel, and Cunningham, 1996	36 Finnish managers and 31 foreign managers	No	Adapted from Milani (1975)	Adapted from Govindarajan (1984) and from Gupta and Govindarajan (1984)
Hirst, 1987	44 Australian managers	No	Milani (1975)	Mahoney *et al*. (1963, 1965)
Hoque, and Brosnan, 2007	55 Australian managers	Yes	Milani (1975)	Mahoney *et al*. (1963, 1965)
Jermias, and Setiawan, 2008	204 Indonesian public managers	No	Adapted from Vroom and Mann (1960)	Adapted from Mahoney *et al*. (1963, 1965)
Kenis, 1979	169 American	No	Personal scale	Personal scale

Studies	Samples	Randomised-sample	Budgetary participation measurement scale	Managerial performance measurement scale
	managers			
Kobori, 2006	81 Taiwanese managers	Yes	Hofstede (1967)	Mahoney *et al*. (1963, 1965)
Kren, 1992	80 American managers	Yes	Milani (1975)	Mahoney *et al*. (1963, 1965)
Lau, and Buckland, 2000	71 Norwegian managers	Yes	Milani (1975)	Mahoney *et al*. (1963, 1965)
Lau and Lim, 2002	83 Australian managers	No	Milani (1975)	Mahoney *et al*. (1963, 1965)
Lau, Low, and Eggleton, 1995	112 Singaporean managers	Yes	Milani (1975)	Mahoney *et al*. (1963, 1965)
Lau, and Tan, 1998	104 Australian managers and 85 Singaporean managers	Yes	Milani (1975)	Mahoney *et al*. (1963, 1965)
Leach-López, Stammerjohan, and Lee, 2009	71 South Korean managers	No	Milani (1975)	Mahoney *et al*. (1963, 1965)
Leach-López, Stammerjohan, and McNair, 2007	45 Mexican and 98 American managers	No	Milani (1975)	Mahoney *et al*. (1963, 1965)
Lindquist, 1995	Experiment with 86 students (USA supposed)	Yes	Personal scale	Personal scale
Merchant, 1981	19 American companies	No	Personal scale	Personal scale
Merchant, 1984	170 American managers	No	Personal scale	Personal scale
Mia, 1988	51 Australian managers	No	Milani (1975)	Personal scale
Mia, 1989	62 New Zealander managers	No	Milani (1975)	Personal scale
Mia, and Patiar, 2002	52 Australian managers	No	Milani (1975)	Mahoney *et al*. (1963, 1965)
Milani, 1975	81 (supposed American) foremen	No	Milani (1975)	Personal scale
Ni, and Su, 2001	205 Taiwanese managers	Yes	Milani (1975)	Mahoney *et al*. (1963, 1965)
Ni, Su, Chung, and Cheng, 2005	155 Taiwanese managers	Yes	Milani (1975)	Mahoney *et al*. (1963, 1965)
Nouri, and Parker, 1998	135 American managers	No	Milani (1975)	Govindarajan and Gupta (1985)
Orpen, 1992	136 Australian managers	No	Milani (1975)	Personal scale
Otley, and Pollanen, 2000	121 Canadian managers	No	Milani (1975)	Mahoney *et al*. (1963, 1965)
Parker, and Kyj,	70 (supposed	No	Milani (1975)	Mahoney *et al*.

Studies	Samples	Randomised-sample	Budgetary participation measurement scale	Managerial performance measurement scale
2006	American) managers			(1963, 1965)
Quirin, O'Bryan, and Donnelly 2004	98 American managers	Yes	Milani (1975)	Mahoney *et al*. (1963, 1965)
Sheely Heath, and Brown, 2007	256 American employees	Yes	Milani (1975)	Fraser (1995)
Shields, Deng, and Kato, 2000	358 Japanese engineers	No	Adapted from Shields and Young (1993)	Personal scale
Shields, and Young 1993	98 American corporate controllers	No	Personal scale	Personal scale
Su, 2001(published in Ni, Su, and Su, 2003)	194 Japanese and Taiwanese managers in Taiwan	Yes	Hofstede (1967)	Mahoney *et al*. (1963, 1965)
Su, and Lin, 2007	168 Taiwanese managers	Yes	Milani (1975)	Mahoney *et al*. (1963, 1965)
Subramaniam and Ashkanasy, 2001	114 Australian managers	Yes	Milani (1975)	Mahoney *et al*. (1963, 1965)
Taylor, Abdul-Hamid, and Mohd-Sanusi, 2008	81 Malaysian managers from a local public administration	No	Milani (1975)	Adapted from Mahoney *et al*. (1963, 1965)
Tiller, 1983	Experiment with 150 students in psychology (USA supposed)	Yes	Personal scale	Personal scale
Tintri, 2002	53 (supposed Indonesian) managers	No	Milani (1975)	Mahoney *et al*. (1963, 1965)
Tsamenyi, and Mills, 2002	89 Ghanean managers	No	Milani (1975)	Mahoney *et al*. (1963, 1965)
Tsui, 2001	89 managers from Hong Kong	No	Milani (1975)	Mahoney *et al*. (1963, 1965)
Wentzel, 2002	74 (supposed American) managers in a large hospital	No	Milani (1975)	Mahoney *et al*. (1963, 1965)
Winata, and Mia, 2005	74 Australian managers	No	Adapted from Milani (1975)	Personal scale
Yahya, Ahmad, and Fatima, 2008	111 Malaysian managers from the Ministry of Defence	No	Milani (1975)	Mahoney *et al*. (1963, 1965)
Yuen, 2007	216 Chinese public managers	No	Milani (1975) (supposed)	Mahoney *et al*. (1963, 1965)